LINEAR BEARING

The present invention relates to linear bearings.

Linear bearings are used for a number of purposes, for instance ball conveyors as shown in GB Patent No 543,524 (Curran) and GB Patent No 1,263,456 (NRDC). The principle of ball conveyors has been used for moving loads such as boxes or workpieces and also for patients in a hospital.

The present invention is also designed in different forms to cope with the problem of moving objects of the same width as above including heavy structures like bridge components as well as for handling patients.

Rescue stretchers are either rigid or flexible and are normally placed to one side of a patient who is then lifted or rolled (termed "logrolled") on to the stretcher. Both methods of placing the patient on the stretcher are dangerous since spinal injuries can be aggravated by the action of lifting or rolling. In order to prevent further injury where spinal injury has already occurred, it is clearly necessary if possible to move the patient onto a stretcher without disturbing the patient, particularly moving the patient's head relative to the rest of the patient's body.

A linear bearing according to the present invention comprises a frame at least partly surrounding two matrices each of a plurality of spheres, each matrix when flat having its spheres mounted for rotation in substantially a single plane, the plane of one matrix being parallel to that of the other matrix, the spheres of one matrix located so as to lie at least mostly against the spheres of the other matrix so that rotation of spheres of one matrix results in counter rotation of spheres of the other matrix.

Figure 9 is an exploded perspective view of the platform of Figure 8;

Figure 10 is a diagrammatic view of another embodiment of the invention showing a spherically linear bearing and a rectilinear bearing;

Figure 11 is a diagrammatic side view of a resilient linear bearing according to an alternative embodiment of the invention; and

Figure 12 is a diagrammatic view of a rotatable or rectilinear movable bearing according to a still further embodiment of the invention.

The bearing in the form of a mat of Figure 1 is formed with a frame 2 made of a flexible plastics material having a chamfered edge 4 and supporting an upper perforated sheet 6 and a lower perforated sheet 8. The upper perforated sheet locates a plurality of spheres 10 and together they form a first matrix 12. The lower perforated sheet 8 locates rows of spheres 14 which form a second matrix 16. The upper rows of spheres 10 of the first matrix seat on the lower spheres of the second matrix in such a way that most of the upper spheres each are supported on four lower spheres.

The upper spheres 10 located in perforations 18 of sheet 6 are such as to allow free rotation of spheres 10. Similarly, perforations 20 in lower sheet 8 allow free rotation of spheres 14. Since the upper spheres are seated on the lower spheres, any rotation of the lower spheres will cause counter rotation of the upper spheres. In this way, any movement of bearing 1 when placed on the ground will cause the upper spheres to move in the opposite direction to the bearing.

The spheres 10 and 14 are preferably made of hard plastics

either used to transfer a patient from a stretcher on to the bed or else pulled under the patient so that the patient can be lifted off the bed for changing sheets. For this purpose the spheres 50 (see Figures 5 and 6) are about 5 mm in diameter or less. The bearing for this embodiment is formed by threading the spheres on sacrificial thread 52 and weaving the threaded spheres into a matrix, then dissolving the sacrificial thread to leave the spheres rotatably supported by the weave 54 of the woven matrix.

Figure 7, 8 and 9 show a substantially rigid composite plate 60 incorporating the bearing of the invention in which a first matrix 62 of spheres 61 is located above a second matrix 64. Each matrix is carried in a perforated sub plate 65, 65' which are secured together as shown in Figure 7.

In Figure 9 there can be seen telescopic arms 70 which attach by means of ball joints 72 and brackets 74 to the top sub plate 65'. These arms are designed to push the plate 60 under an article, in particular an injured person, so that the person is not subject to injurious movement whilst being transferred from one location (e.g. an accident site) to another (e.g. an ambulance). Carrying handles (not shown) can be provided on the plate.

Figure 10 is a diagrammatic view of, for instance, a ship to shore gangway or vehicular connection between shore and pontoon - the relative movement between ship and shore is similar to that between pontoon and shore. In this case, the shore is shown at 80 and pontoon at 82. Between shore and pontoon is a "bridge" 84 which has a semi spherical bearing surface 85 at one end and a bearing plate 86 mounted at 87 to the bridge.

The bearing surface 85 fits over a spherical plate 88 of spheres 89 of, say, between 2.5 and 7.5 mm held in two matrices 90 and 92. Matrices 90 and 92 are fixed to semi

CLAIMS

1. A bearing comprising a frame at least partly surrounding two matrices each of a plurality of spheres, each matrix when flat having its spheres mounted for rotation in substantially a single planar or at least part spherical plane, the plane of one matrix being parallel to that of the other matrix, the spheres of one matrix located so as to lie at least mostly against the spheres of the other matrix so that rotation of spheres of one matrix results in counter rotation of spheres of the other matrix.

2. A bearing according to claim 1 wherein the spheres are between 25 mm and 15 mm in diameter.

3. A bearing according to claim 1 or 2 further comprising an inflatable platform arranged to be detachably joined to the bearing.

4. A bearing according to claim 3 wherein the inflatable platform is provided with detachable poles disposable on either side of the platform and so arranged for carrying the platform.

5. A bearing according to claim 1 wherein the spheres are between 2.5 and 7.5 mm in diameter.

6. A bearing according to claim 1 or 5 wherein the spheres are woven into each matrix.

7. A bearing as claimed in claim 1 wherein the matrices are curved in one or more planes.

8. A bearing as claimed in claim 1 wherein the frame is attached to an upper or lower member via an elastomeric layer.

9. A bearing as claimed in claim 1 as fitted into a rectilinear or circular track.

10. A bearing substantially as described with reference to any one or more of the accompanying drawings.